



Influenza vaccination of recommended adult populations, U.S., 1989–2005[☆]

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Summary

Objective: To assess influenza vaccination coverage among recommended adult populations in the United States.

Methods: Data from the 1989 to 2005 National Health Interview Surveys (NHISs), weighted to reflect the civilian, non-institutionalized U.S. population, were analyzed to determine self-reported levels of influenza vaccination among persons aged ≥ 65 years, persons with high-risk conditions, health care workers (HCW), pregnant women, and persons living in households with at least one identified person at high risk of complications from influenza infection. We stratified data by race/ethnicity to identify racial/ethnic disparities.

Results: Vaccination coverage levels among all recommended adult populations peaked in 2004, then declined in 2005 in association with the 2004–2005 vaccine shortage. Coverage for adults ≥ 65 years of age increased from 30.1% (95% confidence interval [CI]: 28.8–31.3) in 1989 to 70.0% (68.0–71.5) in 2004. In 2004, coverage was 40.7% (39.0–42.5) for all adults 50–64 years, 27.2% (24.6–29.9) for adults aged 18–49 years with high-risk conditions, 43.2% (39.9–46.6) for health care workers, 21.1% (19.1–23.4) for non-high-risk adults aged 18–64 years with a high-risk household member, and 14.4% (8.8–22.9) for pregnant women. Among each of the recommended adult sub-groups, vaccination coverage was higher for non-Hispanic whites compared to minority groups.

[☆] *Disclaimer:* The findings and conclusions in this presentation are those of the authors and do not necessarily represent the views of CDC.

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Conclusions: By 1997, influenza vaccination coverage had exceeded the national 2000 objective of 60% among persons aged ≥ 65 years, but by 2004 still remains well below the national 2010 target of 90%. Coverage levels for other groups targeted for influenza vaccination also are far short of the Healthy People 2000 and 2010 goals of 60% for persons aged 18–64 years with high-risk conditions, health care workers, and pregnant women. A concerted effort to increase provider adoption of standards for adult immunization, public awareness, and stable vaccine supplies are needed to improve influenza vaccination rates among recommended groups, and to reduce racial and ethnic disparities.

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Introduction

Influenza is a major cause of morbidity and mortality among adults in the United States. During the 1990–1999 influenza seasons, approximately 36,000 excess deaths were attributed annually to influenza with more than 90% of deaths occurring in persons 65 years and older [1,2]. Influenza-related disease is responsible for an average of 226,000 excess hospitalizations per year in the United States [3]. The influenza vaccine has been proven to be an efficacious and cost-effective tool for reducing morbidity and mortality associated with influenza in adults [4–11]. Influenza vaccination of healthy working adults <65 years of age can decrease the rates of influenza-like illness, lost workdays, and physician visits and can prevent illness and complications among children and older adults [11–16]. The economic impact of influenza infection is substantial. The cost of a severe influenza epidemic has been estimated to be \$87.1 billion [17]. Much of this illness, death and associated economic costs could be prevented with higher influenza vaccination coverage levels.

Influenza vaccination is recommended for persons at increased risk for complications from influenza, including all persons aged 65 years and older, younger persons with chronic diseases such as diabetes, chronic heart conditions, chronic obstructive pulmonary disease (COPD), asthma, cancer, and kidney failure, and women who will be pregnant during the influenza season. Influenza vaccine is also recommended for persons who can transmit influenza to those at high risk such as health care workers (HCW), and household contacts [1]. In addition, all persons 50–64 years are recommended to be vaccinated as a substantial proportion of persons in this group have one or more medical conditions which increase their risk of complications.

Despite the presence of safe and effective vaccine and long-standing recommendations to provide annual influenza vaccination to target populations, vaccination levels are suboptimal [18–26]. To assess progress toward achieving 2010 national health objectives and implementation of the Advisory Committee on Immunization Practice (ACIP) recommendations, we analyzed the data from 1989 to 2005 National Health Interview Survey (NHIS). This study evaluated: (1) influenza vaccination prevalence among persons aged ≥ 65 years, persons 50–64 years, adults aged <65 years with high-risk conditions, health care workers, pregnant women, and persons in close contact with persons at high risk; (2) trends in vaccination; and (3) racial/ethnic disparities in influenza vaccination among target populations.

Methods

The National Health Interview Survey is a national household survey conducted annually by National Center for Health Statistics (NCHS). The data have been continuously collected since 1957. The NHIS questionnaire consists of two basic parts: a set of basic health and demographic items; and one or more sets of questions on current health topics [27]. This analysis used variables from the sample adult core. In the sample adult core, one adult per sampled family was randomly selected and asked to complete the sample adult questionnaire. In 2004, a total of 31,326 adults aged 18 years and older participated. The final response rate for the sample adult core was 72.5%.

Participants were asked “During the past 12 months, have you had a flu shot?” Vaccination status was determined by their affirmative or negative answer. Respondents were also asked whether they had ever been told by a doctor or other health professional that they had “emphysema,” “chronic bronchitis,” “coronary heart disease,” “angina,” “a heart attack,” any other heart condition or heart disease,” “diabetes,” “kidney failure,” or “cancer”. Questions regarding asthma status were “Have you ever been told by a doctor or other health professional that you had asthma?” and “During the past 12 months, have you had an episode of asthma or asthma attack?” In addition, female respondents were asked “Are you currently pregnant?”

We defined high-risk persons as individuals who self-reported one or more of the following: ever being told by a physician they had diabetes, emphysema, coronary heart disease, angina, heart attack or other heart condition; being diagnosed with cancer in the past 12 months (excluding non-melanoma skin cancer) or ever being told by a physician they have lymphoma, leukemia or blood cancer; during the past 12 months, being told by a physician they have chronic bronchitis or weak or failing kidneys; or reporting an asthma episode or attack in the past 12 months.

Individuals were classified as health care workers if they were currently employed in a health care occupation or in a health care industry setting, based on standard occupation and industry categories recoded into categories by the National Center for Health Statistics at CDC. Health occupation included health diagnosing occupations, health assessment and treating occupations, health technologists, and health service occupations. Health care settings included hospitals, nursing or personal care facilities, and offices of physicians, dentists, chiropractors, optometrists or other health care practition-

ers. Classification of HCW is described further in Walker et al. [25].

Household contacts were defined as persons aged 18–64, who themselves were not in a high-risk group and not an HCW, living in households with at least one identified person at high risk of complications from influenza infection. Because only one sample adult is selected per family, high-risk adult family members could only be identified on the basis of age at the time of the survey (≥ 65 years). High-risk child family members were identified based on age and high-risk conditions (all children <2 years, and children 2–17 years with high-risk conditions such as asthmas, cystic fibrosis, sickle cell anemia, diabetes, congenital heart disease, and other heart conditions). In addition, since 1997 a sample child/adult was selected for each family, not just each household.

We assessed influenza vaccination among ACIP adult target groups and stratified by race/ethnicity. Wald Chi-square statistical tests were performed to see if racial/ethnic differences within each target group were significant. Influenza vaccination rates from 1989 to 2005 or 1997 to 2005 were evaluated based on whether the variables were available or not in each survey year. A test for linear trends in recent years was conducted for each target group [28]. Individuals who refused to answer the influenza vaccination question or did not know their vaccination status were excluded from the analysis. There were 1.4% (275) individuals who did not know their influenza vaccination status in 2004. This proportion varied from 1989 to 2005 (ranged from 0.01% to 2.0%). Since 2004, a question on receipt of the influenza nasal spray vaccination was included in the questionnaire, but we excluded those data from the analysis because the number who reported vaccination with the spray alone in the past 12 months was very small ($<0.5\%$) and these reports may be less accurate. To better approximate past season coverage, we reported coverage restricted to individuals interviewed during February through August. For example, respondents interviewed February–August 2004 were analyzed to estimate influenza vaccine coverage for the 2003–2004 influenza season. We focused primarily on NHIS 2004 data (2003–2004 season) in the results because of a vaccine shortage for the 2004–2005 season, which was associated with substantially lower vaccine coverage estimates based on the 2005 NHIS data.

SUDAAN statistical software (Software for the statistical analysis of correlated data, Research Triangle Institute; Research Triangle Park, NC) was used to generate point estimates and 95% confidence intervals and to account for the complex sampling design of the National Health Interview Survey. All analyses were weighted to reflect the age, sex, and race/ethnicity of the U.S. non-institutionalized civilian population.

Results

After excluding participants with missing values for our study variables, 18,356 participants were included in the analysis in 2004; among those adults, 22.4% were 50–64 years of age, and 19.2% were 65 years or older. Among persons aged 18–64 years, 18.7% reported having a high-risk condition. Health care workers made up 8.2% of respondents.

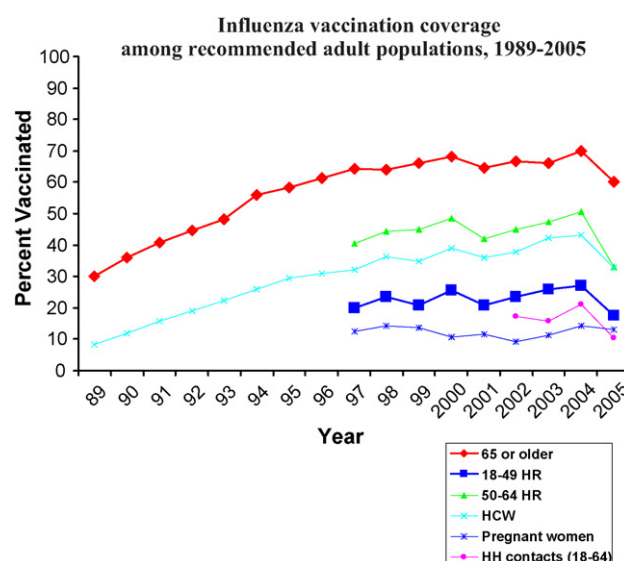


Figure 1 National Health Interview Survey (NHIS) 1989–2005. *Each year includes persons interviewed during February–August of the year and approximates coverage for the prior fall–winter vaccination period (2005 means 2004–2005 season, and so on). **Household contacts are persons aged 18–64 years living in households with at least one identified person at high risk of complications from influenza infection including children <2 years. Vaccination of contacts of children <2 years was just encouraged for 2002–2003 and 2003–2004 seasons, and then fully recommended for the 2004–2005 season of vaccine shortage.

Influenza vaccination coverage in 2004 for adults ≥ 65 years of age was 70.0% (95% CI = 68.0–71.5%) compared to 40.7% (95% CI = 39.0–42.5%) for persons aged 50–64 years. During 1989–1999, influenza vaccination coverage for elderly adults increased steadily each year (test for trend, $p < 0.05$), but plateaued from 1999 to 2004 (test for trend $p > 0.05$) (Fig. 1, Table 1). The coverage dropped substantially in 2005. In 2004, vaccination coverage levels for persons ≥ 65 years of age were 72.7% (95% CI = 70.9–74.4%) for non-Hispanic whites, 49.5% (95% CI = 43.1–55.9%) for non-Hispanic blacks, and 59.0% (95% CI = 52.5–65.3%) for Hispanics (Table 2).

In 2004, coverage among persons aged 18–64 years with high-risk conditions was lower for younger adults (ages 18–49: 27.2% [95% CI = 24.6–29.9%] vs. ages 50–64: 50.5% [95% CI = 47.2–53.9%]) (Table 1) overall and in each racial/ethnic group (Table 2). In both age groups (18–49 and 50–64), vaccination coverage was higher among high-risk persons (27.2% and 50.5%, respectively) compared to those without identified high-risk conditions (18.6% and 36.8%, respectively). From 1999 to 2004, influenza vaccination coverage among those aged 50–64 years with high-risk conditions remained at a stable level (test for trend: $p > 0.05$) (Fig. 1, Table 1), but coverage slowly increased for persons aged 18–49 years with high-risk conditions during the same period (test for trend, $p < 0.05$). Among high-risk persons in both age groups (18–49 and 50–64), coverage substantially declined in 2005. Vaccination coverage in both age groups was significantly lower for non-Hispanic blacks and Hispanics compared to non-Hispanic whites ($p < 0.01$) (Table 2).

Table 1 Influenza vaccination coverage for recommended adult populations, National Health Interview Survey (NHIS)^a

	NHIS 2004			NHIS 2005		
	Sample size	Weighted sample size	Vaccination rate (95% CI)	Sample size	Weighted sample size	Vaccination rate (95% CI)
Age group						
50–64	4,076	47,757,022	40.7 (39.0, 42.5)	4,399	49,214,722	21.4 (20.1, 22.8)
65+	3,491	34,019,061	70.0 (68.0, 71.5)	3,603	34,251,524	60.2 (58.3, 62.2)
Persons with high-risk condition						
18–64	2,724	31,726,465	37.5 (35.3, 39.8)	3,000	34,203,280	24.5 (22.8, 26.3)
18–49	1,502	17,599,726	27.2 (24.6, 29.9)	1,560	18,724,466	17.6 (15.5, 19.9)
50–64	1,222	14,126,739	50.5 (47.2, 53.9)	1,440	15,478,814	33.0 (30.3, 35.7)
Persons without high-risk condition						
18–64	11,837	146,073,420	22.8 (21.8, 23.7)	12,215	145,305,367	10.3 (9.7, 10.9)
18–49	8,995	112,574,496	18.6 (17.6, 19.6)	9,262	111,627,834	8.5 (7.9, 9.2)
50–64	2,842	33,498,924	36.8 (34.8, 38.9)	2,953	33,677,533	16.2 (14.6, 17.8)
Pregnant women	156	1,967,438	14.4 (8.8, 22.9)	180	2,155,587	13.2 (8.3, 20.3)
HCW	1,188	14,376,913	43.2 (39.9, 46.6)	1,264	14,798,810	32.8 (30.1, 35.5)
Household contacts of persons at high risk including children <2 years						
Total	1,698	23,414,554	21.1 (19.1, 23.4)	1,646	21,834,669	10.3 (8.7, 12.0)
18–49	1,406	19,212,052	17.4 (15.4, 19.5)	1,358	17,872,443	7.5 (6.0, 9.2)
50–64	292	4,202,502	38.1 (32.3, 44.3)	288	3,962,226	22.4 (17.7, 27.8)

^a This table is based on February–August interviews only.

Table 2 Influenza vaccination coverage among recommended adult populations by race/ethnicity (2004 NHIS)^a

	Vaccination rate (95% CI)				<i>p</i> ^{***}
	NH-white	NH-black	Hispanic	Others	
Age group					
50–64	43.7 (41.6, 45.8)	27.3 (23.2, 31.9)	32.0 (27.4, 37.1)	36.6 (28.1, 46.0)	<0.01
65+	72.7 (70.9, 74.4)	49.5 (43.1, 55.9)	59.0 (52.5, 65.3)	61.8 (47.0, 74.6)	<0.01
Persons with high-risk condition					
18–64	39.6 (37.0, 42.3)	28.9 (24.1, 34.1)	29.1 (24.0, 34.8)	50.6 (40.3, 60.8)	<0.01
18–49	28.3 (25.1, 31.7)	24.1 (18.3, 31.0)	20.1 (14.5, 27.3)	42.0 (27.1, 58.4)	<0.05
50–64	52.9 (48.9, 56.8)	36.4 (28.2, 45.4)	45.0 (36.7, 53.5)	59.7 (43.0, 74.4)	<0.01
Pregnant women	18.9 (10.9, 30.8)	^b	^b	^b	
HCW	47.3 (43.3, 51.5)	29.4 (22.5, 37.4)	33.2 (25.0, 42.4)	46.1 (30.5, 62.5)	<0.01
Household contacts of persons at high risk including children <2 years					
18–64	26.5 (23.6, 29.7)	12.8 (8.2, 19.3)	11.0 (8.1, 14.7)	15.1 (8.4, 25.5)	<0.01
18–49	22.0 (19.1, 25.2)	11.7 (7.1, 18.7)	9.6 (6.9, 13.3)	13.5 (7.0, 24.3)	<0.01
50–64	41.8 (35.0, 48.9)	^b	^b	^b	

^a This table is based on February–August interviews only. NH stands for non-hispanic.

^b The standard of reliability is RSE < 0.3 (where RSE = the ratio of the standard error and the prevalence, se/percent), this estimate did not meet the standard or there were <30 respondents in the denominator.

^{***} *p* value indicates chi-square test for association between racial/ethnic groups with NH-white as the reference group.

In 2004, 4.4% (156) women aged 18–44 years reported they were pregnant when interviewed. From 1997 to 2004, vaccination coverage among pregnant women aged 18–44 years without any high-risk conditions ranged from a low of 9.3% in 2002 to 14.4% in 2004 (Fig. 1, Table 1) and did not differ statistically compared to non-pregnant women of the same age group ($p > 0.05$) (data not shown). Coverage among pregnant women was stable during 1997–2004 (test for trend, $p > 0.05$). Influenza vaccination coverage was 18.9% in 2004 for non-Hispanic white women who were currently pregnant with no reported medical conditions; estimates for other racial and ethnic groups were unreliable due to small numbers (Table 2).

Among healthcare workers, influenza vaccination increased from 8.3% (95% CI = 7.4–9.4%) in 1989 to 43.2% (95% CI = 39.9–46.6%) in 2004 (test for trend, $p < 0.05$) (Fig. 1, Table 1), but was significantly lower in 2005. Non-Hispanic white HCWs reported significantly higher coverage (47.3%, 95% CI = 43.3–51.5%) than non-Hispanic African-Americans (29.4%, 95% CI = 22.5–37.4%), and Hispanics (33.2%, 95% CI = 25.0–42.4%) (Table 2).

Among identified household contacts aged 18–64 years who lived with a high-risk person, influenza vaccination coverage ranged from 15.7% to 21.1% during 2002–2004 and was significantly lower in 2005 (Fig. 1). Household contacts aged 18–49 years were significantly less likely than persons aged 18–49 with high-risk conditions to report an influenza vaccination (17.4%, 95% CI = 15.4–19.5% and 27.2%, 95% CI = 24.6–29.9%, respectively); a similar pattern was observed for persons aged 50–64 years (Table 1). Among household contacts aged 18–64 years, the estimated percentages of non-Hispanic blacks and Hispanics having received influenza vaccination (12.8%, 95% CI = 8.2–19.3% and 11.0%, 95% CI = 8.1–14.7%, respectively) were lower than those for non-Hispanic whites (26.5%, 95% CI = 23.6–29.7%). These racial/ethnic disparities remained when age groups were split into 18–49 years and 50–64 years (Table 2).

In 2005, vaccination coverage among each of the recommended adult sub-groups was significantly lower compared to 2004, except for pregnant women (Fig. 1, Table 1).

Discussion

The results of this study indicate that national influenza vaccination coverage among persons aged ≥ 65 years of age substantially increased from 1989 to 1999, but largely plateaued after 1999. A significant drop occurred in 2005 due to the 2004–2005 influenza vaccine shortage. Among adults aged ≥ 65 years, the 2000 national health objective level of 60% influenza vaccination coverage was first attained in 1997. However, looking toward year 2010, influenza vaccination coverage in 2004 (70.0%) still remained well below the 90% target. The objective of 90% by 2010 is unlikely to be reached unless effective intervention strategies are developed and programs are widely implemented to dramatically improve influenza vaccination coverage among this age group.

Influenza vaccination levels were also far below target levels for adults 18–64 years old with high-risk conditions and were significantly affected by delays and shortages in influenza vaccine. The substantial and unexpected reduction in the supply of influenza vaccine for the 2004–2005 season and the delay in vaccine distribution in 2000–2001 are reflected in the coverage results [29,30], but do not explain all of the lack of recent progress in improving influenza vaccine coverage in adults aged ≥ 65 years and high-risk persons aged 18–64 years.

Although substantial data exists regarding the benefits of influenza vaccine in high-risk groups, only one randomized trial of influenza vaccine has been conducted among community dwelling persons 60 years and older [1,15,31–33] and recent articles have questioned the benefit of the influenza vaccine particularly among the elderly [34–36]. Although many frail elderly may not respond optimally to influenza

vaccination, the vaccine remains the single best prevention tool against influenza and its complications. Raising influenza vaccination rates among the elderly and among their contacts, including health care workers, can only serve to better protect those most vulnerable to influenza complications. Communication challenges in sustaining interest and effort toward obtaining vaccination each year are formidable, but may be more sustainable if vaccine supply remains reliable in future years.

Trends in vaccination coverage among HCWs indicate some progress in improving coverage in this group. Health care workers can spread the highly contagious influenza virus to patients and may have contributed to the death of patients [37–39]. Despite being recommended annually for health care workers by ACIP, and being part of the Standards for Adult Immunization Practices [40], influenza vaccination coverage among health care workers was not optimal. Moreover, approximately 70% of health care workers stated they had worked despite having influenza-like symptoms, further highlighting the importance of influenza prevention efforts, including following infection control measures in this group [41]. Although rates of health care worker vaccination are low, with moderate efforts, organized campaigns can obtain much higher rates of vaccination among this population [25,42].

Pregnancy can increase the risk for serious medical complications from influenza infection [43–46]. In 1997, the ACIP recommended that women who will be in the second or third trimester of pregnancy during the influenza season need to get the influenza vaccination [47]. In 2004, the recommendation was expanded to include all women who are pregnant during the influenza season [1]. Pregnant women were the least likely of recommended adult target populations to be vaccinated, ranging from 9.3% to 14.4%, 1997–2004. In a study of influenza vaccination during pregnancy, 22% had discussed influenza vaccine with their physicians during pregnancy, with only 8% of respondents having been vaccinated [48]. Concerns about safety of any drug or vaccine use during pregnancy likely affects willingness of pregnant women to seek vaccination. However, no risk to pregnant women or their unborn children from influenza vaccination has been demonstrated [49,50]. In order to improve vaccine coverage, the Ob/Gyn role as the primary care provider who vaccinates pregnant women should be promoted and successful strategies need to be identified in these settings.

Decreasing transmission of influenza from household contacts to persons at high risk might reduce influenza-related deaths among persons at high risk. Influenza transmission in households is a subject of renewed interest. One study showed that overall in 279 households in which a person was diagnosed with influenza, 131 (24.1%) secondary influenza cases occurred among the 543 household contacts [51]. ACIP recommends that close contacts of persons at high risk for complications from influenza should receive influenza vaccine [1]. Limited information is available regarding use of influenza vaccine among household contacts. Approximately 70 million persons aged 18–64 years without other indications for influenza vaccination are household contacts in the U.S. [52]. But this study showed the coverage among household contacts aged 18–64 years was only 21.1%. Providers need to recommend and pro-

vide vaccinations to household contacts. Further studies are needed to determine why providers are not encouraging more strongly influenza vaccination for household contacts.

The findings in this study indicate a marked difference in influenza vaccination coverage by race/ethnicity. Non-Hispanic whites were persistently more likely to be vaccinated than non-Hispanic blacks and Hispanics among persons aged ≥ 65 years, high-risk persons aged 18–64 years, health care workers, and household contacts. For pregnant women only non-Hispanic whites had a large enough sample size for reliable estimates of coverage. Our results concur with the findings of other studies that have documented racial/ethnic differences in influenza vaccination in the United States [21,24,25,53–55]. These differences may result from a combination of factors, including differences in attitudes toward vaccination and preventive care, differences in patient–provider interactions, differences in propensity to seek and accept vaccination, and differences in quality of care [24,25,53–59]. Further studies are needed to examine the contribution of other factors so that we can more fully understand the complex causes of these patterns and especially ways to overcome barriers blocking higher coverage.

There were limitations that may affect the generalization of the results. All data for this study were collected by self-report by an adult family member and influenza vaccination status and high-risk conditions were not validated against medical records. However, adult self-reported vaccination status has been shown to have high sensitivity and moderate specificity [60], with a range of 5–11% net over reporting bias. A second limitation is that we cannot directly assess season-specific estimates from 1989 to 2004 because individuals were asked “During the past 12 months, have you had a flu shot?” From 2005 on, “Which month and year did you get your most recent flu shot?” was added to the questionnaire that will allow us to more accurately evaluate influenza vaccination coverage by season. In 2005, estimated coverage for the 2004–2005 season among persons aged ≥ 65 years based on reported month/year (September 2004–January 2005) was similar to coverage based on February–August interview data (58% vs. 60%). A third potential limitation is that we identified pregnant women based on being pregnant at the time of the survey; information on the stage of pregnancy or due date was not available. In addition, we could measure influenza vaccination coverage on only a subset of household contacts of high-risk persons. Finally, information was not available for some high-risk conditions (such as neurological-related conditions that impair lung function) identified by ACIP.

Substantial improvement in annual influenza vaccination of currently recommended groups, their household contacts and healthcare workers, and elimination of racial and ethnic disparities in influenza vaccine coverage are needed to maximally reduce the health impact of influenza. Strategies to improve coverage in adults include institution of reminder-recall systems, use of media promotions and educational programs, implementation of standing orders programs, and utilization of alternative, convenient locations in addition to medical settings for adults to obtain annual influenza vaccine, such as worksite vaccination programs [41,61,62].

Appendix A

Influenza vaccination coverage (%) for recommended adult populations, National Health Interview Survey (NHIS), 1989–2005^a

Recommended groups	NHIS survey year ^b															
	1989	1991	1993	1994	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2004	2005
65 or older	30.1	40.9	48.3	56.0	58.4	64.2	64.0	66.0	68.1	64.5	66.7	66.0	70.0	60.2	70.0	60.2
18–49 With high-risk conditions	c	c	c	c	c	20.0	23.5	20.8	25.6	20.9	23.5	26.0	27.2	17.6	27.2	17.6
50–64 With high-risk conditions	c	c	c	c	c	40.4	44.2	45.0	48.6	42.1	44.9	47.2	50.5	33.0	47.2	33.0
HCW	8.3	15.7	22.4	26.0	29.5	32.2	36.2	34.9	39.0	36.0	37.8	42.2	43.2	32.8	43.2	32.8
Pregnant women	c	c	c	c	c	12.6	14.4	13.8	10.6	11.5	9.3	11.2	14.4	13.2	11.2	14.4
HH contacts (18–64) ^d	c	c	c	c	c	c	c	c	c	c	17.3	15.7	21.1	10.3	15.7	21.1

^a This table is based on February–August interviews only.^b Each year includes persons interviewed during February–August of the year and approximates coverage for the prior fall–winter vaccination period (2005 means 2004–2005 season, and so on).^c Data were not available.^d Household contacts are persons aged 18–64 years living in households with at least one identified person at high risk of complications from influenza infection including children <2 years. Vaccination of contacts of children <2 years was just encouraged for 2002–2003 and 2003–2004 seasons, and then fully recommended for the 2004–2005 season of vaccine shortage.

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